

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for ~~managing~~ configuring multiple resources in a system, ~~wherein each resource is capable of being configured by multiple elements associated with that resource, each element configuring that resource in a manner different from other elements,~~ comprising:
 - receiving a user request for an operation that requires performing ~~separate element operations with respect to~~ separately configuring multiple resources in the system;
 - in response to the user request, ~~communicating~~ selecting a service configuration policy that implements a predetermined service quality;
 - using the service configuration policy to communicate commands to multiple elements, ~~wherein each a selected element for each resource is capable of managing one of the resources in the system;~~
 - for each element receiving at least one of the communicated commands, performing:
 - (i) interpreting the received command;
 - (ii) ~~performing the element operation~~ configuring its associated resource as requested by the received command ~~with respect to the managed resource, wherein all the element operations resource configurations performed by all the elements in response to receiving the commands implement the user requested operation with the predetermined service quality.~~
2. (Currently Amended) The method of claim 1, wherein the user requested operation comprises a request to allocate at least one resource in the system to a host in the system, ~~and wherein the element operations requested by the~~

~~received command comprise configuration operations to configure the managed resources to implement the user requested resource allocation.~~

3. (Original) The method of claim 2, wherein the request to allocate the at least one system resource comprises a request to allocate additional storage space in the system to the host.

4. (Original) The method of claim 3, wherein the request to allocate the at least one system resource includes a request to allocate the storage space to a logical volume in the host, wherein the resources managed by the elements comprise a storage device, a switch, a host adaptor, file system, and a volume manager, wherein the element managing the storage device allocates the storage space to the host, wherein the element managing the switch is capable of allocating at least one path in the switch to the storage device to allow the host to access the allocated storage space, wherein the element managing the host adaptors allocates at least one host adaptor in the host to communicate with the switch to access the allocated storage space, and wherein the element managing the volume manager assigns the allocated storage space in the device to the requested logical volume used by the host.

5. (Original) The method of claim 4, wherein the system is capable of including multiple storage devices, switches, and host adaptors in the host, and wherein there is at least one separate element to manage each storage device and switch in the system.

6. (Original) The method of claim 5, further comprising:
in response to the communicated commands, determining, with the elements, at least one switch and storage device in the system capable of supplying the storage and path resources to satisfy the user request, wherein the commands are communicated to the elements managing the determined switches and storage devices.

7. (Canceled).

8. (Currently Amended) The method of claim 7 1, wherein there is an application program interface (API) set for each resource in the system, wherein the multiple element objects capable of managing one resource call the same API set to perform operations with respect to the managed resource.

9. (Original) The method of claim 1, wherein the commands are communicated by using element proxy objects registered with a lookup service.

10. (Currently Amended) A method for managing multiple resources in a system, wherein each resource is capable of being configured by multiple elements, each element configuring that resource in a manner different from other elements, comprising:

registering a configuration service proxy object with a lookup service, wherein the configuration service proxy object includes code enabling access to a configuration service capable of configuring resources in the system to produce a predetermined service quality;

registering configuration element proxy objects with the lookup service, wherein the configuration element proxy objects include code enabling access to element configurations that are capable of configuring system resources;

using the code in the configuration proxy object to communicate a user request for a configuration operation with respect to at least one system resource to the configuration service; and

using, with the configuration service, the code in the configuration element proxy objects to communicate commands to a selected one of the configuration elements for each resource to implement the requested configuration operations with the requested quality of service; and

19 in response to receiving the commands from the configuration service,
20 performing, with the configuration elements, a configuration operation on the
21 resource indicated in the received commands.

1 11. (Original) The method of claim 10, wherein all the configuration operations
2 performed by all the configuration elements in response to receiving commands
3 from the configuration service implement the user requested configuration
4 operation.

1 12. (Original) The method of claim 10, wherein the user requested configuration
2 operation comprises a request to allocate a resource in the system to a host in
3 the system, and wherein the configuration operations performed by the
4 configuration elements receiving the commands from the configuration service
5 implement the user requested resource allocation.

1 13. (Original) The method of claim 12, wherein the user requested resource
2 allocation comprises a request to allocate more storage space in the system to
3 the host.

1 14. (Original) The method of claim 10, wherein the request to allocate the system
2 resource includes a request to allocate the storage space to a logical volume in
3 the host, wherein the resources managed by the configuration elements
4 comprise a storage device, a switch, a host adaptor, and a volume manager,
5 wherein the configuration element managing the storage device allocates the
6 storage space to the host, wherein the configuration element managing the
7 switch is capable of allocating one or more paths in the switch to the storage
8 device to allow the host to access the allocated storage space, wherein the
9 configuration element managing the host adaptors is capable of allocating one or
10 more host adaptors to access the allocated storage space through the switch,
11 and wherein the configuration element managing the volume manager assigns
12 the allocated storage space to the requested logical volume.

- 1 15. (Original) The method of claim 10, wherein the system is capable of including
2 multiple storage devices, switches, and host adaptors in the host, and wherein
3 there is at least one separate configuration element to manage each storage
4 device and switch in the system.
- 1 16. (Original) The method of claim 15, further comprising:
2 in response to the user request, determining, with the configuration
3 elements, at least one switch, storage device, and host adaptor in the system
4 capable of supplying the storage and path resources to satisfy the user
5 request, wherein the configuration elements configure the determined switches
6 and storage devices.
- 1 17. (Original) The method of claim 16, wherein the configuration elements query
2 information on the system components to determine the system components
3 capable of satisfying the user requested configuration operation.
- 1 18. (Original) The method of claim 16, wherein configuration policy parameters
2 are provided with each configuration element that specify how each
3 configuration element configure the associated switch, storage device, or host
4 adaptor.
- 1 19. (Original) The method of claim 18, wherein the configuration policy
2 parameters specify a level of availability to provide with the allocated
3 storage space.
- 1 20. (Original) The method of claim 14, wherein there are multiple configuration
2 services calling different sets of elements to provide different qualities of
3 configurations, further comprising:
4 selecting one of the configuration services.

1 21. (Original) The method of claim 14, wherein the system is further capable of
2 including backup programs and snapshot image programs, wherein there is at
3 least one configuration element to manage each backup program and
4 snapshot image program in each host.

22. (Canceled).

1 23. (Currently Amended) The method of claim 22 10, wherein there is an application
2 program interface (API) proxy object for each resource in the system, wherein
3 the multiple elements capable of configuring one resource use the same API
4 proxy object to configure the associated resource.

1 24. (Original) The method of claim 10, wherein the configuration service proxy
2 object enables either remote or local access to the configuration service to
3 configure capable of configuring resources in the system
4

5 25. (Currently Amended) A method for ~~managing~~ configuring multiple resources in a
6 system, wherein each resource is capable of being configured by multiple
7 elements associated with that resource, each element configuring that resource
8 in a manner different from other elements, comprising:
9 invoking a management program;
10 providing the management program a set of user specified operational
11 parameters to use for a ~~system~~ configuration operation performed with respect to
12 the system resources;
13 selecting with the management program a service configuration policy that
14 implements a predetermined service quality;
15 calling, with the ~~management program~~ service configuration policy
16 ~~multiple elements, wherein each~~ a selected element for each resource is capable
17 ~~of managing one of the resources in the system by performing an element~~
18 ~~operation;~~

for each element called by ~~the management program~~ service configuration policy, performing:

- (i) interpreting the received command;
- (ii) ~~performing the element operation~~ configuring its associated resource as requested by the received command ~~with respect to the managed resource, wherein the elements control the managed~~ configure the resource resources according to ~~predefined element operational parameters and the user specified operational parameters~~ the service configuration policy to provide the requested service quality.

26. (Original) The method of claim 25, wherein the user specified operational parameters comprise a request to allocate at least one resource in the system to a host in the system, wherein the element operations comprise configuration operations to configure the managed resources to implement the user specified resource allocation.

27. (Original) The method of claim 26, wherein the request to allocate the at least one system resource comprises a request to allocate additional storage space in the system to the host.

28. (Original) The method of claim 27, wherein the request to allocate the at least one system resource includes a request to allocate the storage space to a logical volume in the host, wherein the resources managed by the elements comprise a storage device, a switch, a host adaptor, file system, and a volume manager, wherein the element managing the storage device allocates the storage space to the host, wherein the element managing the switch is capable of allocating at least one path in the switch to the storage device to allow the host to access the allocated storage space, wherein the element managing the host adaptors allocates at least one host adaptor in the host to communicate with the switch to access the allocated storage space, and wherein the

11 element managing the volume manager assigns the allocated storage space in
12 the device to the requested logical volume used by the host.

1 29. (Original) The method of claim 28, wherein the system is capable of including
2 multiple storage devices, switches, and host adaptors in the host, and wherein
3 there is at least one separate element to manage each storage device and
4 switch in the system.

30. (Canceled).

1 31. (Currently Amended) The method of claim ~~30~~ 25, wherein there are multiple
2 management programs, wherein each management program calls one of the
3 multiple elements for each resource to control, and wherein different
4 management programs call different elements for at least one resource to
5 perform different operations with respect to the resource.

1 32. (Currently Amended) A system for ~~managing~~ configuring multiple
2 resources, wherein each resource is capable of being configured by
3 multiple elements associated with that resource, each element
4 configuring that resource in a manner different from other elements,
5 comprising:
6 multiple resources;
7 means for receiving a user request for an operation that
8 requires ~~performing separate element operations with respect to the~~
9 separately configuring multiple resources in the system;
10 means for ~~communicating~~ selecting, in response to the user request, a
11 service configuration policy that implements a predetermined service policy;
12 means for using the service configuration policy to communicate
13 commands to multiple elements, wherein each a selected element for each
14 resource is capable of managing one of the resources in the system;

multiple element means for performing, in response to receiving at least one of the communicated commands, interpreting the received command and ~~performing the element operation~~ configuring its associated resource as requested by the received command ~~with respect to the managed resource,~~ wherein all ~~the element operations~~ resource configurations performed by all the elements in response to receiving the commands implement the user requested operation with the predetermined service quality.

33. (Currently Amended) The system of claim 32, wherein the user requested operation comprises a request to allocate at least one resource in the system to a host in the system, ~~and wherein the element operations requested by the received command comprise configuration operations to configure the managed resources to implement the user requested resource allocation.~~

34. (Original) The system of claim 33, wherein the request to allocate the at least one system resource comprises a request to allocate additional storage space in the system to the host.

35. (Original) The system of claim 34, wherein the request to allocate the at least one system resource includes a request to allocate the storage space to a logical volume in the host, wherein the resources managed by the elements comprise a storage device, a switch, a host adaptor, file system, and a volume manager, wherein the element managing the storage device allocates the storage space to the host, wherein the element managing the switch is capable of allocating at least one path in the switch to the storage device to allow the host to access the allocated storage space, wherein the element managing the host adaptors allocates at least one host adaptor in the host to communicate with the switch to access the allocated storage space, and wherein the element managing the volume manager assigns the allocated storage space in the device to the requested logical volume used by the host.

- 1 36. (Original) The system of claim 35, wherein the system is capable of including
2 multiple storage devices, switches, and host adaptors in the host, and wherein
3 there is at least one separate element means to manage each storage device
4 and switch in the system.
- 1 37. (Original) The system of claim 36, wherein the multiple element means further
2 perform:
3 determining at least one switch and storage device in the system capable
4 of supplying the storage and path resources to satisfy the user request, wherein
5 the commands are communicated to the elements managing the determined
6 switches and storage devices.
38. (Canceled).
- 1 39. (Currently Amended) The system of claim ~~38~~ 32, wherein there is an application
2 program interface (API) set for each resource in the system, wherein the multiple
3 element objects capable of managing one resource call the same API set to
4 perform operations with respect to the managed resource.
- 1 40. (Original) The system of claim 32, wherein the commands are communicated by
2 using element proxy objects registered with a lookup service.
- 1 41. (Currently Amended) An article of manufacture including code for ~~managing~~
2 configuring multiple resources in a system, wherein each resource is capable of
3 being configured by multiple elements associated with that resource, each
4 element configuring that resource in a manner different from other elements by:
5 receiving a user request for an operation that requires ~~performing~~
6 ~~separate element operations with respect to~~ separately configuring multiple
7 resources in the system;
8 in response to the user request, ~~communicating~~ selecting a service
9 configuration policy that implements a predetermined service quality;

10 using the service configuration policy to communicate commands to
11 ~~multiple elements, wherein each a selected element for each resource is capable~~
12 ~~of managing one of the resources in the system;~~

13 for each element receiving at least one of the communicated commands,
14 performing:

- 15 (i) interpreting the received command;
- 16 (ii) performing the element operation configuring its associated
17 resource as requested by the received command ~~with respect to~~
18 ~~the managed resource, wherein all the element operations resource~~
19 configurations performed by all the elements in response to
20 receiving the commands implement the user requested operation
21 with the predetermined service quality.

1 42. (Currently Amended) The article of manufacture of claim 41, wherein the user
2 requested operation comprises a request to allocate at least one resource in the
3 system to a host in the system, ~~and wherein the element operations requested by~~
4 ~~the received command comprise configuration operations to configure the~~
5 ~~managed resources to implement the user requested resource allocation.~~

1 43. (Original) The article of manufacture of claim 42, wherein the request to allocate
2 the at least one system resource comprises a request to allocate additional
3 storage space in the system to the host.

1 44. (Original) The article of manufacture of claim 43, wherein the request to allocate
2 the at least one system resource includes a request to allocate the storage space
3 to a logical volume in the host, wherein the resources managed by the elements
4 comprise a storage device, a switch, a host adaptor, file system, and a volume
5 manager, wherein the element managing the storage device allocates the
6 storage space to the host, wherein the element managing the switch is capable
7 of allocating at least one path in the switch to the storage device to allow the host
8 to access the allocated storage space, wherein the element managing the host

adaptors allocates at least one host adaptor in the host to communicate with the switch to access the allocated storage space, and wherein the element managing the volume manager assigns the allocated storage space in the device to the requested logical volume used by the host.

45. (Original) The article of manufacture of claim 44, wherein the system is capable of including multiple storage devices, switches, and host adaptors in the host, and wherein there is at least one separate element to manage each storage device and switch in the system.

46. (Original) The article of manufacture of claim 45, further comprising:
in response to the communicated commands, determining, with the elements, at least one switch and storage device in the system capable of supplying the storage and path resources to satisfy the user request, wherein the commands are communicated to the elements managing the determined switches and storage devices.

47. (Canceled).

48. (Original) The article of manufacture of claim 41, wherein there is an application program interface (API) set for each resource in the system, wherein the multiple element objects capable of managing one resource call the same API set to perform operations with respect to the managed resource.

49. (Original) The article of manufacture of claim 41, wherein the commands are communicated by using element proxy objects registered with a lookup service.

50. (Currently Amended) An article of manufacture including code for managing multiple resources in a system, wherein each resource is capable of being configured by multiple elements associated with that resource, each element configuring that resource in a manner different from other elements by:

5 registering a configuration service proxy object with a lookup service,
6 wherein the configuration service proxy object includes code enabling access to
7 a configuration service capable of configuring resources in the system to produce
8 a predetermined service quality;

9 registering configuration element proxy objects with the lookup service,
10 wherein the configuration element proxy objects include code enabling access to
11 element configurations that are capable of configuring system resources;

12 using the code in the configuration proxy object to communicate a user
13 request for a configuration operation with respect to at least one system resource
14 to the configuration service;

15 using, with the configuration service, the code in the configuration element
16 proxy objects to communicate commands to a selected one of the configuration
17 elements for each resource to implement the requested configuration operations
18 with the requested quality of service; and

19 in response to receiving the commands from the configuration service,
20 performing, with the configuration elements, a configuration operation on the
21 resource indicated in the received commands.

1 51. (Original) The article of manufacture of claim 50, wherein all the configuration
2 operations performed by all the configuration elements in response to receiving
3 commands from the configuration service implement the user requested
4 configuration operation.

1 52. (Original) The article of manufacture of claim 50, wherein the user requested
2 configuration operation comprises a request to allocate a resource in the system
3 to a host in the system, and wherein the configuration operations performed by
4 the configuration elements receiving the commands from the configuration
5 service implement the user requested resource allocation.

- 1 53. (Original) The article of manufacture of claim 52, wherein the user requested
2 resource allocation comprises a request to allocate additional storage space in
3 the system to the host.
- 1 54. (Original) The article of manufacture of claim 50, wherein the request to allocate
2 the at least one system resource includes a request to allocate the storage space
3 to a logical volume in the host, wherein the resources managed by the
4 configuration elements comprise a storage device, a switch, a host adaptor, file
5 system, and a volume manager, wherein the configuration element managing the
6 storage device allocates the storage space to the host, wherein the configuration
7 element managing the switch is capable of allocating one or more paths in the
8 switch to the storage device to allow the host to access the allocated storage
9 space, wherein the configuration element managing the host adaptors is capable
10 of allocating one or more host adaptors to access the allocated storage space
11 through the switch, and wherein the configuration element managing the volume
12 manager assigns the allocated storage space to the requested logical volume.
- 1 55. (Original) The article of manufacture of claim 50, wherein the system is
2 capable of including multiple storage devices, switches, and host adaptors in
3 the host, and wherein there is at least one separate configuration element to
4 manage each storage device and switch in the system.
- 1 56 (Original) The article of manufacture of claim 55, further comprising:
2 in response to the user request, determining, with the configuration
3 elements, at least one switch, storage device, and host adaptor in the system
4 capable of supplying the storage and path resources to satisfy the user
5 request, wherein the configuration elements configure the determined switches
6 and storage devices.

- 1 57. (Original) The article of manufacture of claim 56, wherein the configuration
2 elements query information on the system components to determine the system
3 components capable of satisfying the user requested configuration operation.
- 1 58. (Original) The article of manufacture of claim 56, wherein configuration policy
2 parameters are provided with each configuration element that specify how
3 each configuration element configure the associated switch, storage device,
4 or host adaptor.
- 1 59. (Original) The article of manufacture of claim 58, wherein the configuration
2 policy parameters specify a level of availability to provide with the allocated
3 storage space.
- 1 60. (Original) The article of manufacture of claim 54, wherein there are multiple
2 configuration services calling different sets of elements to provide different
3 qualities of configurations, further comprising:
4 selecting one of the configuration services.
- 1 61. (Original) The article of manufacture of claim 54, wherein the system is further
2 capable of including backup programs and snapshot image programs, wherein
3 there is least one configuration element to manage each backup program and
4 snapshot image program in each host.
62. (Canceled).
- 1 63. (Currently Amended) The article of manufacture of claim 62 50, wherein there is
2 an application program interface (API) proxy object for each resource in the
3 system, wherein the multiple elements capable of configuring one resource use
4 the same API proxy object to configure the associated resource.

1 64. (Original) The article of manufacture of claim 50, wherein the configuration
2 service proxy object enables either remote or local access to the configuration
3 service to configure capable of configuring resources in the system
4

5 65. (Currently Amended) A computer readable medium including data structures for
6 managing configuring multiple resources in a system, wherein each resource is
7 capable of being configured by multiple elements associated with that resource,
8 each element configuring that resource in a manner different from other
9 elements, comprising:

10 a manager object which selects a service configuration policy that
11 implements a predetermined service quality, the service configuration policy
12 including multiple commands that together ~~implement a system operation with~~
13 ~~respect to~~ separately configure multiple resources in the system; and

14 multiple element objects, wherein each element object ~~is capable of~~
15 ~~managing configures~~ one of the resources in the system, wherein the manager
16 object service configuration policy communicates commands to multiple
17 elements a selected element for each resource, wherein each element receiving
18 at least one of the communicated commands interprets the received command
19 and ~~performs an element operation~~ configures its associated resource as
20 requested by the received command ~~with respect to the managed resource,~~
21 wherein all the ~~element operations~~ resource configurations performed by all the
22 elements in response to receiving the commands implement the requested
23 system operation with the predetermined service quality.

1 66. (Currently Amended) The computer readable medium of claim 65, wherein the
2 system operation comprises a request to allocate at least one resource in the
3 system to a host in the system, ~~and wherein the element operations requested~~
4 ~~by the received command comprise configuration operations to configure the~~
5 ~~managed resources to implement the user requested resource allocation.~~

- 1 67. (Original) The computer readable medium of claim 65, wherein each resource in
2 the system is capable of being managed by multiple elements, wherein each of
3 the multiple elements that manage one resource performs the element
4 operation in a different manner than other elements.
- 1 68. (Original) The computer readable medium of claim 67, wherein there is an
2 application program interface (API) set for each resource in the system, wherein
3 the multiple element objects capable of managing one resource call the same
4 API set to perform operations with respect to the managed resource.
- 1 69. (Original) The computer readable medium of claim 65, wherein the manager
2 object and element objects comprise proxy objects, further comprising:
3 a lookup service including registered instances of the manager proxy
4 objects and element proxy objects, wherein the manager and element proxy
5 objects include code enabling access to the operations performed by the proxy
6 objects.